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pansion of the hot solar gases, caused by the centrifugal action of the whirl, cools them sufficiently to produce the appearance of a dark cloud, which we call a sun-spot. If this cooling is not great enough to produce a visible darkening of the surface, the whirling storm may still be present, though invisible to the eye. Such invisible whirls have now been detected by their magnetic effect on the light emitted by the luminous vapors within them.

Magnetic fields in visible sun-spots were first found by Dr. Hale in 1908. They are due to the whirl of electrified particles in the spot vortex, just as the magnetic field of an electromagnet is produced by the whirl of electrons through its wire coils. The magnetic field in a sun-spot is recognized by the effect it produces on the lines in the spectrum. A line due to iron vapor, for example, is split into three parts by the powerful magnetic field in a large spot. In a very small spot, where the magnetic field is much weaker, the line is not split up but is merely widened.

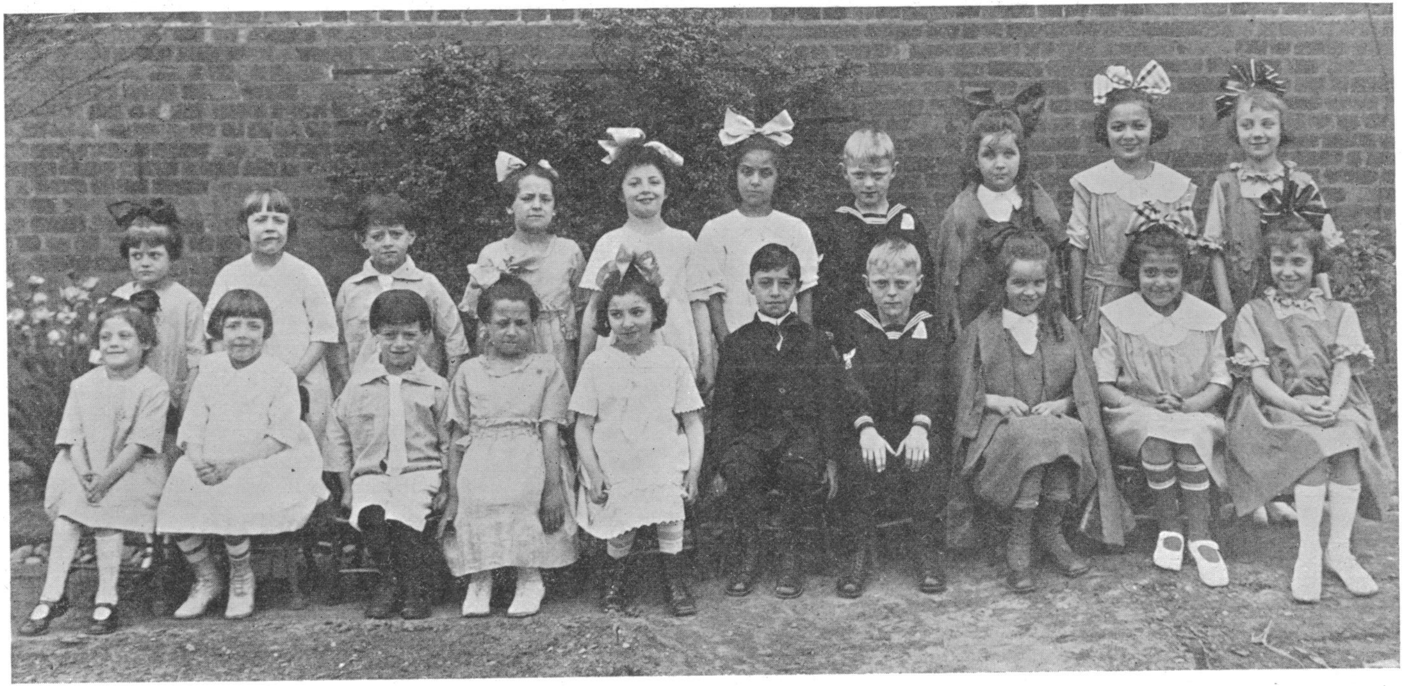
Invisible spots were discovered by exploring promising regions of the sun where signs of disturbance, such as faculæ or clouds of calcium vapor, are present. A special polarizing apparatus moves back and forth across the slit, while the iron line is watched through a very powerful spectroscope. The presence of a weak magnetic field, showing the existence of an invisible spot, is betrayed by a slight oscillation of the corresponding part of the line, caused by its widening successively to right and left as the polarizing apparatus oscillates over the slit.

Ten invisible spots have been found since November by this method by Messrs. Hale, Ellerman and Nicholson with the 150-foot tower telescope and 75-foot spectroscope on Mount Wilson. Some of them foreshadow the birth of a visible spot, which finally appears to the eye several days after the first indications of the whirl have been found. Others correspond to the period of decay, and permit a spot to be traced for some time after it ceases to be visible. In other cases the invisible spot never reaches maturity, which means that the cooling produced by expansion never becomes great enough to produce perceptible darkening of the sun's disk.

TWINS AGAIN

THE popular interest in twins seems to have considerable vitality. Every year brings into the public press and magazines some news item or article concerning multiple births. Just a year ago the whole country was stirred by the announcement of the birth of quadruplets in New Haven, Connecticut. (By the way, they have all passed their first birthday). Recently the newspapers carried full accounts of the death of the conjoined Blazek twins of Chicago, recalling the older days when the Siamese twins were in the prints and broadsides. Now comes Los Angeles, with photographic evidence that in one school building are enrolled as many as nine pairs of twins. And on the heels of the City of Angels comes the City of Churches, Brooklyn, with a contingent of ten pairs of twins, all attending Public School 77. Some statistician may soon find for us a rural school in which 30 per cent. or more of the entire enrollment are twins.

After all, twins are more common than we ordinarily suppose; and our interest in them far exceeds their rarity. Wappeus found that more than one child was born in 1.17 per cent. of 20,000,000 cases of labor. Pre-war Prussian statistics showed that twins occurred once in 89, triplets once in 7,910, and quadruplets once in 371,125 labors. This does not, of course, mean that all survive. The hazards of birth and of both prenatal and neonatal life are greater for plural than for singular pregnancies.



Wide World Photos.

TWINS ATTENDING A BROOKLYN PUBLIC SCHOOL

A comparison of international statistics appears to indicate that multiple pregnancy is more common in cold than in warm climates. We should, therefore, not be surprised that Brooklyn has a higher record than Los Angeles! If the figures quoted by Williams can be trusted, Russia is in this special sense over twice as prolific as Spain. In Russia, multiple birth occurred once in 41.8 labors, as compared with once in 113.6 labors in Spain.

The accompanying photographs raise some interesting questions in regard to the distribution of sex among twins. In the aggregate 38 children are pictured, of which 18 are boys, and 15 of these happen to be in the California group. This approximates the equal or nearly equal divisions which we should expect when all the twin boys and girls in the land are counted. But there are other interesting questions. Suppose the Brooklyn group were playing helter-skelter in the school yard. Would it be possible for a stranger to select all the pairs of twins and match each to the appropriate co-twin It happens that there is such a predominance of same-sexed similar twins that this could be readily done. Suppose, however, that the Los Angeles group were scrambled in the same manner, would it be possible by inspection to pair off all the twins? This is doubtful. It would be particularly difficult to make a confident decision in the case of the four children in the back row, beginning with the third from the left. This difficulty brings out clearly the fact that there are marked differences as well as resemblances between twins. We, of course, always expect at least some degree of family resemblance, but even this may not be obvious to ordinary observation.

The problem of twin resemblance is discussed by Dr. Arnold Gesell, professor of child hygiene, Yale University, in two recent articles on "Mental and Physical Correspondence in Twins," published in the April and May numbers of THE SCIENTIFIC MONTHLY. He describes a remarkable case showing extensive, detailed correspondence both in physical and psychological characters in a pair of gifted girl twins. He notes, however, that pathological deviation in the process of twinning may produce monstrous degrees of individual difference even in twins derived from a single egg. Biologists recognize two major classes of human twins: (1) Duplicate or uni-oval, who are always of the same sex, closely resemble one another and presumably originate from one fertilized egg. All but one of the Brooklyn group apparently belong to this class; (3) Fraternal or bi-oval twins, who may or may not be of the same sex, who show ordinary family resemblance and are in all probability derived from two separate eggs. Two pairs, at least, of the Los Angeles twins belong to this category. Statistics based on a large series of cases indicate that one pair of twins in every three pairs born consists of a boy and a girl, and that about two out of every five pairs in which the members are of the same sex are uni-oval in origin. Since there are only two pairs of two sexed or "pigeon" twins in the combined group of 18 pairs in the photographs, we must again be cautious in drawing general deductions from the pictures.

Do resemblances decrease with age? Such a deduction might be drawn from the Los Angeles photograph, but it would not be well supported by the facts. Two pairs of twins of the fraternal type happen to include the older children in this group, and resemblances are less marked in this type. The fundamental correspondences, both physical and mental, to be found in twins unquestionably have a hereditary basis and are only in a secondary way affected by time and experience. Time may, by a cumulative process, accentuate a differentiation of twin personalities dating from childhood or youth, but the primary differences and resemblances are due to original nature. The study of twins does not shake our confidence in the importance of education and surroundings, though it impresses upon us at every turn the decisive significance of inheritance and the lawfulness of the mechanics of development. The popular interest in twins is a wholesome one, because twins are a key to many biological and psychological principles at the basis of human welfare.

SCIENTIFIC ITEMS

WE record with regret the death of Henry Marion Howe, emeritus professor of metallurgy in Columbia University; of John Sandford Shearer, professor of physics at Cornell University; of George Simonds Boulger, the English writer on botany; of Ernest Solvay, known for his process for the manufacture of soda; and of C. L. A. Laveran, of the Pasteur Institute.

AMONG five busts unveiled in the Hall of Fame for Great Americans at New York University on May 20 was one of Maria Mitchell, the gift of her nephew, William Mitchell Kendall, and the work of Emma S. Brigham. President Henry Noble McCracken, of Vassar College, where Miss Mitchell was professor of astronomy from 1865 to 1888, unveiled the bust.

DR. RAY LYMAN WILBUR, president of Stanford University, has been elected president of the American Medical Association for the meeting to be held next year at San Francisco.

THE Croonian lecture was delivered before the Royal Society on June 1, by Dr. T. H. Morgan, professor of experimental zoology in Columbia University. His subject was "The mechanism of heredity."

DR. W. W. CAMPBELL, director of the Lick Observatory, has been elected president of the International Astronomical Union in succession to M. Baillaud, director of the Paris Observatory. The Astronomical Union held its triennial meeting in Rome in May and will hold its next meeting in Cambridge, England.

IT is announced that the contest of the will of Amos F. Eno will be settled out of court by the payment of about four million dollars to Columbia University. The 1915 will, which has been twice broken by juries but both times upheld by courts on appeal, gave the residuary estate to Columbia University. The will made bequests of $250,000 each to the Metropolitan Museum of Art, the American Museum of Natural History, the New York Association for Improving the Condition of the Poor, and the New York University. Had the will been broken finally, these institutions would have received nothing. Whether they receive the full $250,000 each under the settlement, or what proportion of the total they receive, is not disclosed. The Society of Mechanics and Tradesmen received $1,800,000 under the 1915 will, and had that will been broken would have received $2,000,000 under an earlier will. This institution could not therefore be called upon to sacrifice anything in order to satisfy the heirs, and will receive the full $1,800,000.

WE much regret that there was an error in the inscriptions of the illustrations of the note on *Hesperopithecus* in the last issue of this journal. Fig. 2 on page 589 is the important type tooth, whereas Fig. 1 is the second molar of *Hesperopithecus* which serves to confirm the first of the type.